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The prime criteria for private sector participation in renewable energy investment in the Middle East (case study: Iran)☆

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ABSTRACT

To have sustainable electricity generation from renewable energy resources economically competitive, more privatization is needed in this sector. True understanding based on transparent information is one of the salient necessities for the private sector to invest in the energy business. In this article, the researchers are to recognize the targeted factors considered by the private sector in order to improve their participation in the electricity generation markets from renewable sources in the Middle East. The results illustrate that the most important factors are governmental policies, consumption markets, and engineering efficiency. These recognized factors then are classified from different aspects, such as techno-engineering, business and relevant policies, and the environment.

Contents

1. Introduction

The utilization of renewable energy sources (RES) for electricity generation is currently one of the important topics among industrial and scientific bodies. There has been a significant growth in demand of electricity in 21st century caused by social and economic development, particularly in developing countries. In addition, the limitation of fossil fuels as the main supply resource of electricity, have motivated the economists, scientists and politicians to innovate suitable alternatives for the finite energy resources.

Today, for a large number of countries, not only using fossil fuels is not the means of economic growth, but also it might be as a limitation with a potential risk. There are some important factors causing this limitation. For instance, fossil fuels are not harvestable in all the countries nor are they sustainable in the producer countries. Adverse environmental impacts including carbon emissions and other toxic gases that result in global warming are another problem of using these fuels. In addition, highly economical risks

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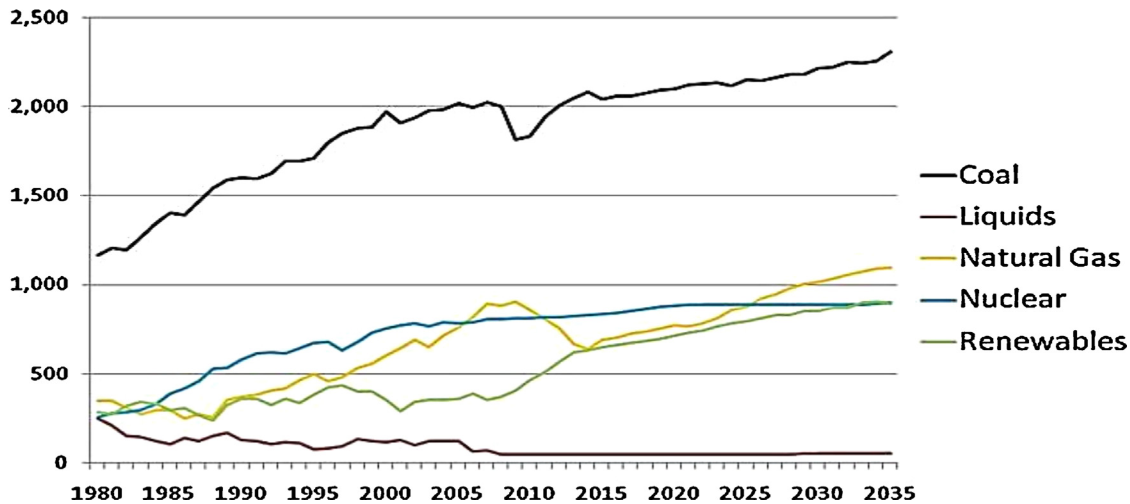


Fig. 1. Trends of electricity generation by fuel in the US [1].

arising from continuous fluctuations in energy prices as well as permanent increase in other costs, such as transportation, make fossil fuels more unreliable.

On the other hand, the technological, environmental and political dangers of nuclear energy and related problems of nuclear power plants, e.g. the disaster in Fukuyama nuclear power plant in Japan in April 2011, illustrates the necessity of research in and use of more reliable RES. Since RESs are clean, eco-friendly, endless, and sustainable, some of the economists and sociologists admit that the only way to reach sustainable development is the maximal consumption of RES. For instance, 10.5% of the demanded electricity in the US has been supplied by the sustainable resources in 2010. Fig. 1 depicts that according to former, present and future energy policies of the US, development strategies in utilization of RES are the main areas of attention [1].

There are also noticeable efforts and long-term plans in other countries, including the European countries for using RES. For example, Norway produced 106.1% of the national electricity demand from RES in 2007, meaning that they have exported even electricity to other countries [2]. According to Eurostat report, growth in utilization of RES was 54% between 1997 and 2007 in the Europe in which wind power has the most growth with 1121% among the others [2].

For harvesting energy from RES, the most significant precondition, beyond the technological issues, is the existence of extractable resources in the target country. The Middle East is, by climatology, one of the potential regions in the world for development of utilization of RES. For instance, while Iran owns 10.3% of the oil reserves and 16% of gas reserves in the world [3], two months solar radiation in Iran is equal to total ever-discovered reservoirs of fossil fuels in this country [4]. Although investment on RES seems unreasonable in this rich region of fossil fuels, the rate of energy consumption, the rising demand of electricity and consequently, increasing rate of carbon emissions result in further need of investment on RES. Therefore, commencement of planning in usage of RES in an efficient way seems essential in this region. This may be observed as an undeniable deficiency in energy policy of the Middle Eastern countries for electricity generation.

Employment is another advantage of the investment in utilization of RES. Due to the nature of RES, development of these energy systems usually occurs in local areas [5]. Therefore, due to the high rate of unemployment in rural regions in the Middle East, utilization of RES can contribute to decrease the privation in these regions.

In order to use RES economically reasonable, they should be diffused pervasively by contribution and support of the private sector. The cooperation of private sector in exploitation of renewable energy is a suitable driver for promoting it into the electricity industry. For instance, according to the official statistics of the Global Energy Organization, the share of private sector in electricity generation is approximately 80% and nearly 75% of the electricity sale to the end user is undertaken by the private industries in the US [6]. However, less than 3% of the investment and operation in energy industry is performed by private sector in the Middle East [7].

Since RES power market offers a profitable future, even in a short-term perspective, there is sufficient possibility and potential for the private sector for investment in this field. However, investors are not still assured about participation and investment. Since investors are committing their assets for sometimes when investing, they need to cover all aspects before making an investment decision [8]. This means that there are important points that an investor wants to consider before investing in order to make a good and informed decision.

This research is to recognize the targeted factors considered by the private sector to improve their participation in the electricity generation from renewable energy sources in the Middle East and Iran as the case study, with specific attention to the challenges and concerns of the investors. Then, the researchers enrich and outline these factors by reviewing recognized scientific references in the fields of energy, investment, and management. Finally, the prioritization of each factor from the investors and experts' point of view will be analyzed and ranked.

2. Background and literature review

2.1. The inefficient structure of energy systems in the Middle East and Iran

The average of annual growth rate of the fossil energy consumption in the Middle East is considerably higher than the global average, compared to the rates of GDP. Although there is a direct relation between development and the energy consumption rate, the increase in energy consumption in the Middle East is however much larger than the other countries with similar economic growth. Fig. 2 shows that while between 2000 and 2009 the annual growth rate of GDP in the world is 4.36 and the annual growth rate of energy consumption is 2.36, in the Middle East, for instance in Saudi Arabia, they are respectively 3.64 and 5.59 [9].

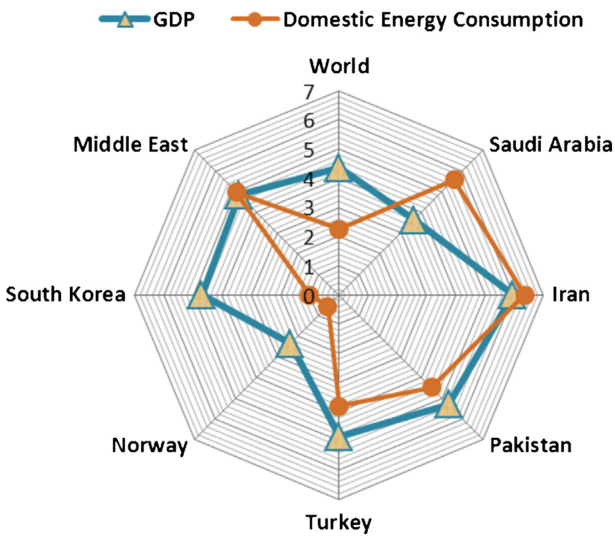


Fig. 2. Average of annual growth rate in the Middle East and some selected countries (2000–2009) [9].

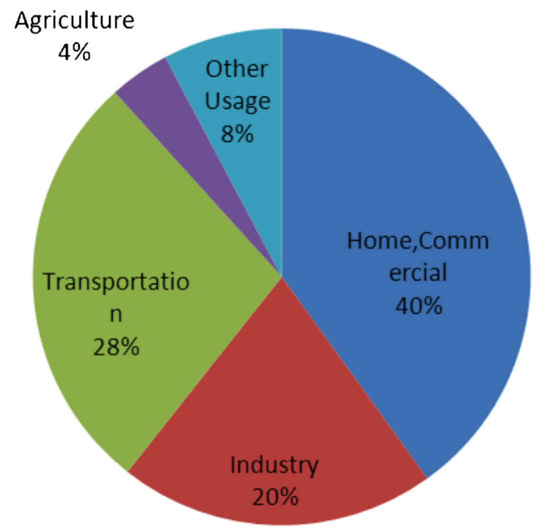


Fig. 3. Consumers segmentation of energy in Iran [11].

A detailed review about Iran reveals that the substantial share of energy consumption, including oil, gas, coal and biomass energy, is in the domestic sector with the average of 40% from 2000 to 2010. Transportation with the average of 28% from 2000 to 2010 and the industry with the average of 20% in the same period are in the lower levels [11]. This means that the significant increase in consumption has not been in result of industrialization nor the efficiency growth. This may indicate the concern of unbalanced energy use and unsustainable development in Iran (Fig. 3). Therefore, comparing the production and consumption levels in Iran in the recent years, the reduction of gap between these two curves that is related to the oil exports, implies that the rate of public income is declining (Fig. 4) [10]. For a country dependent on the fossil fuels exports, this may lead to drop in the economic development indices, Fig. 4.

The reference of energy production and consumption system in Iran in 2008 is illustrated in Fig. 5 [13]. As the graph depicts, only a part of consumption energy is targeted for electricity production. Meanwhile, apposite to some other countries, domestic heating and cooking systems in Iran are supplied by fossil fuels, particularly natural gas.

According to the official statistics of Iranian Power Ministry and the graph, the share of energy consumption in electricity production is approximately 32.9% which the share of fossil fuels is 89.44% in this production in 2010 [13]. This is while the annual electricity consumption growth in Iran is around 8–10% [13].

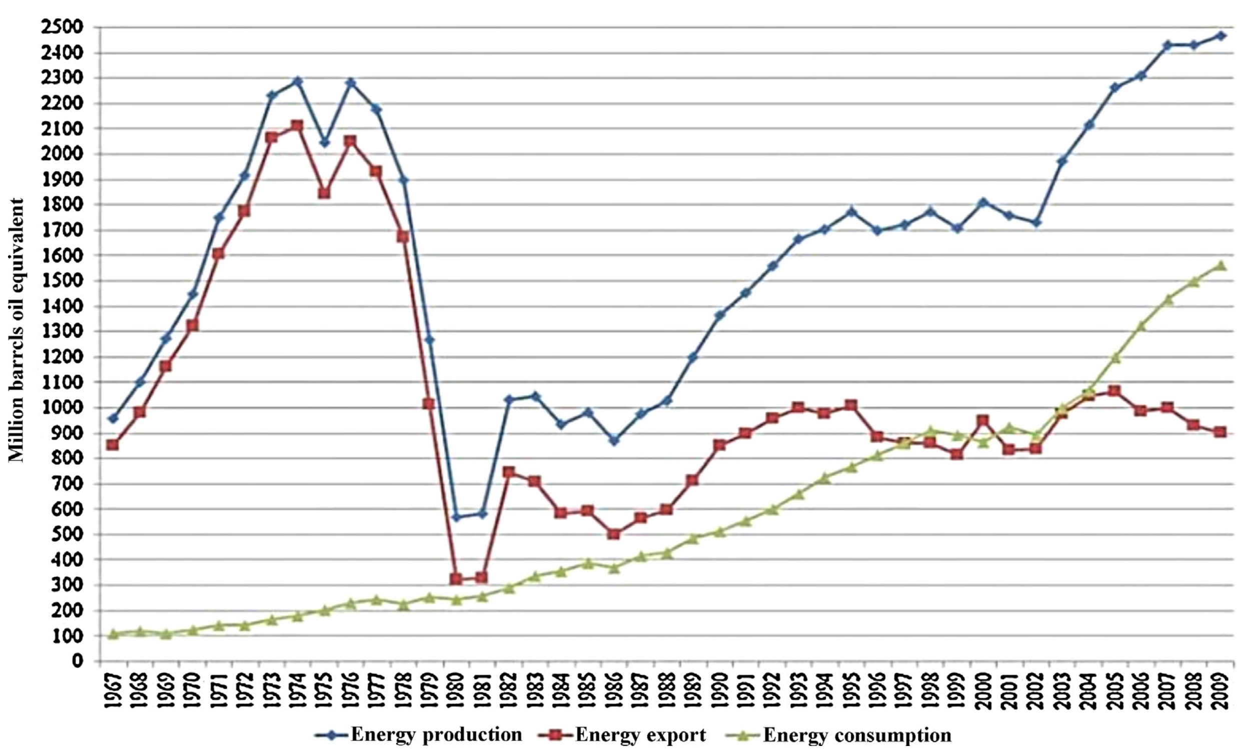


Fig. 4. Total oil production, export and consumption in Iran from 1967 to 2009 [10,12].

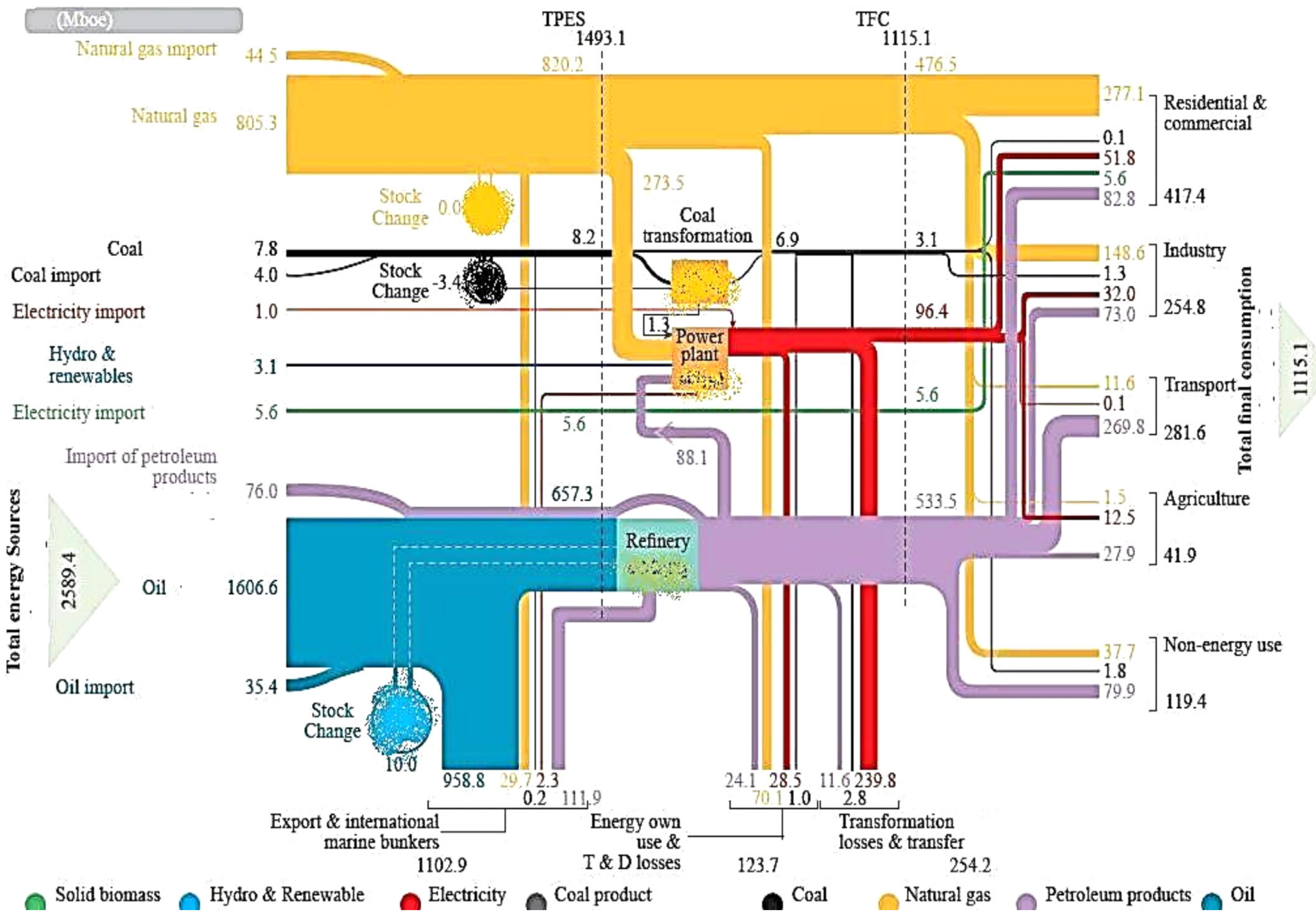


Fig. 5. Iran energy flow [13].

2.2. Development of renewable energy in Iran

Considering the rate of energy consumption in Iran, Iranian Energy Ministry, as the responsible organization for development and generation of electrical energy in Iran, commenced several surveillances and investments in the field of new alternative energy sources (No. 161299 on April 18, 2000, Ministry of Energy's). These investments led to the establishment of an independent research organization but belong to the Ministry, named Renewable Energy Organization of Iran (SUNA) with the help of World Bank [14]. Ever since, SUNA has been operating diverse researches to discover potential areas suitable for extracting renewable energy by building several research stations among which are; Binalud wind plants (2007), etc. [15]. The susceptible geographical location of Iran for exploitation of RES has resulted in exploration of many suitable areas for this objective, according to SUNA's investigations.

Since economy in Iran is mostly governmental, the electricity is exclusively supplied by the government as an economical–social service. For financing energy development projects, local resources including infrastructure budget and stocks portfolio liquidating are used, in addition to the contribution of international agencies. However, the electricity demand growth, future perspective of the industry, constraints of governmental financial resources, and most importantly, marginal growth in RES projects in Iran has made the contribution of the private sector an undeniable necessity. The government is therefore planning to economize the production of electricity in order to make it furthermore attractive for non-governmental bodies.

Due to the existence of great exploitable RES in Iran, the preconditions for collaboration of the private sector in this industry have been provided. Although the governmental incentives have supported this collaboration in the recent years, the private sector's tendency to start a business has however coped with some challenges. Since starting an investment is a delicate decision for making, usually there are some important indexes that the investors probably like to consider before investing in order to make informed decision [8]. This means that an investor prefers to be completely informed about the level of investment risk or the rate of interest of his/her investment.

3. Research methodology

This research includes two main phases, qualitative and quantitative. In the first phase, a survey has been conducted in order to identifying the factors that the investors would prefer to know while investing in electricity generation from RES in Iran. Then, the identified criteria have been enriched and outlined by reviewing internationally recognized scientific references in the fields of energy, investment, and management. The second phase includes a survey in the prioritization of these criteria from the investors and experts' point of view. This can help policy-makers to form their focus and decision based on this result.

3.1. Survey design

A questionnaire has been designed for each phase and survey. The main purpose of the first questionnaire is realizing the

main factors while the second questionnaire has been designed for evaluating and ranking of these factors by using group pair-wise comparisons. Using an open-response questionnaire, the required data has been accumulated. Then, the validity of the measurement criteria has been pre-tested in two stages. First, some problems of the questionnaire have been solved via exerting opinions of three professors in research methods in social science, after the initial design. Then, the questionnaire has been pre-tested among five respondents so that some ambiguities have been removed. Finally, according to the research methodology concepts, the validity of the questionnaire has been proved by the content method [16].

To increase the research reliability, a combination of three community groups has been selected as statistical samples, illustrating in Fig. 6:

1. Investors, especially those are active or likely to invest in energy industry (42% samples).
2. Energy and power experts (31% samples).
3. Researchers and professionals in the fields of investment management and energy (27% samples).

For example, the presence of energy experts in addition to the experts of the Power Ministry, as the associated body of responsible authorities, can transmit the valuable information gained at the meetings and experiences of other investors that the researchers could not meet them.

Among these three groups, 46 sample questionnaires have been selected and distributed through the three methods of face-to-face interview, video conference and phone interview, and emailing the questionnaire. The respondents have been requested to explain their opinions about the most important encouraging and restrictive factors in the investment as well as the most significant points considered by the government and the investors. The first questionnaire has been formed by seven open-answer questions and the related interview usually lasted 15–20 min. The video calls and phone interviews have been all recorded and processed for the next stages in order to extract the crucial points.

3.2. Data analysis

Nvivo9 computer software has been used to manage and analyze the qualitative data of the first phase. Nvivo is a software package in qualitative data analysis produced by QSR Company. It has been designed for qualitative researches using very rich text-based and/or multimedia information, where deep levels of analysis on small or large volumes of data is required. Higher performance with the ability of managing a large amount of data, time reduction, exactness, and flexibility in data processing, and increase in accuracy and credibility are the main reasons that the researchers preferred to use this software in this study [17]. The main page of this work is presented in Fig. 7. The main framework of data accumulation and analysis used by the researchers for this article is depicted in Fig. 8.

According to Fig. 8, after collecting data from three different sources, they were numbered in order of each respondent and the related question, and then it has been coded. In the next step, the mutual points of each response have been recognized and filtered. Finally, the mutual factors have been selected and introduced as the main factors. Since the review and reprocessing has been strictly performed in each stage, the research validity is ensured. Therefore, seven criteria have been extracted from the accumulated data. Three aspects are usually considered in such a project, including engineering, business and policies, and the environmental issues.

From engineering and technical point of view, technological indices related to the project are important. Considering business and related policies, dealing with the governmental policies related to the developing business, as well as customers and market are important. Finally, from the environmental viewpoints, establishing a responsible framework for the society and the governmental bodies are important. Hence, the identified criteria can be named and categorized in three main groups as the main structure that is depicted in Fig. 9.

In continue, each of these identified criteria will be introduced and expanded by the scientific sources.

Table 1
The average efficiency of each energy sources [23].

Energy source	Ave. efficiency
Wind	30–40%
Solar	20–35%
Biomass	30–45%
Hydro	80%
GEO	90%

3.2.1. Technical criteria

3.2.1.1. Engineering efficiency index. The first identified index when the investors want to assess the possibility of investment in one RES for electricity generation is the engineering efficiency of each source. Efficiency has various definitions in different sciences. In management science, for instance, efficiency is the level in which an organization reaches its defined goals [18]. In one of the definitions from energy sector's viewpoint, efficiency is "using less energy to provide the same or improved desirable output [19]". The World Energy Council (WEC) has defined energy efficiency (EE): "it encompasses all the modifications that result in reduction in the energy usage for a given energy service (heating, lighting etc.) or level of activity [20]".

From energy sector's viewpoint, efficiency can be considered in different stages. For example:

1. EE in producing products and providing service for the energy consumer that implies to energy consumption cuts [21].
2. EE based on energy generation, meaning that increasing the energy productivity in an efficient way.

The second definition is the objective of this research for introduction of this index. According to the large number of researchers, efficiency is one of the two core bases of sustainable energy policies in addition to the usage of renewable energy.

Since it can be a factor for both creation of competitive advantage and increasing the customer's satisfaction, understanding the energy efficiency is important for an investor. The more efficiency in electricity production from RES will lead to the further attention to the consumption behavior and, consequently, the more attraction in investment. This index, therefore, can be named as one of the key factors of the investment development.

In order to establish a standard process comparable for different RESs, the researchers have realized and applied the formula of output to input proportion for comparison.

Efficiency = out/in has different units in power and energy. For instance, solar energy efficiency that is applied in electricity production using solar plates is defined as follows [22].

$$\text{Solar efficiency} = \frac{(\text{solar cell power out})}{([\text{sunlight power in}] \times [\text{cell area}])}$$

It should be noticed that the amount of this index depends on various factors, such as the angel of sun radiation, surface material etc. The average of energy efficiency is illustrated in Table 1 [23].

3.2.1.2. Annual exploitability index. One of the concerns of investors at the commencement of a business is the period that a product or

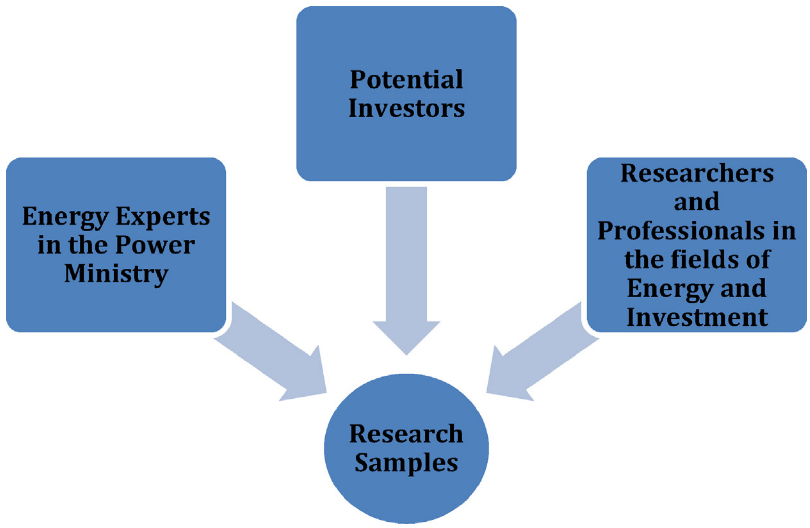


Fig. 6. Statistical population of the research.

service can be efficiently used. Considering this index in energy production, the exploitability of a certain energy resource can be annually examined and compared [24]. For instance, wind blow with the average pace of 26 km/h in south east of Iran from the end of April until September that presents an adequate potential for the electricity production. Since this potential is not permanent in the rest of the year, the attraction for investment in this area substantially declines.

Hence, the investor's awareness about the accessibility and annual exploitability of RES is an important factor to evaluate the sub-indices, such as investment return index, operation risk etc. The calculation content differences are one of the difficulties in quantification of this index. The average availability of solar energy in Iran is 280 days and even, for instance, in Yazd province this average can reach 317 days a year [25].

3.2.1.3. Regional energy potentials (geographical distribution). Iran is a country with different climates. According to a report by Iranian Information and Statistics Organization, all different types of RES can be potentially harvested in Iran [26]. The scene for investment is therefore ready. From competitiveness viewpoint, resources are always considered as a constraint that may even endanger a business. Therefore, having more growth in the number of regions in which renewable energy can be utilized, there will be more attraction for investment, Fig. 10 [27]. This assumption may be considered from different aspects among which the most important one is the potential of harvesting and distribution.

Since small-scale electricity generators, called distributed generation (DG), is one of the potential electricity markets in the country, the evaluation of this index is therefore undeniably

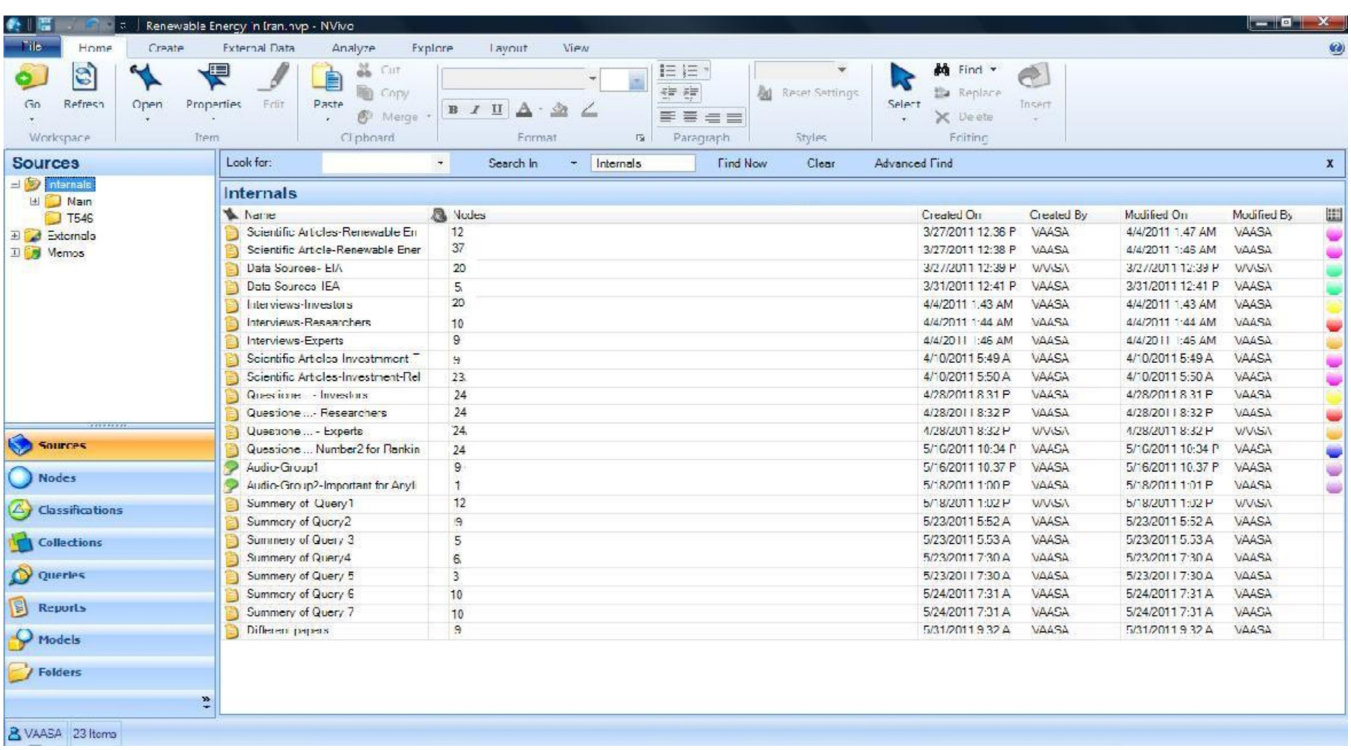


Fig. 7. The "research resources page" of Nvivo9 for this research.

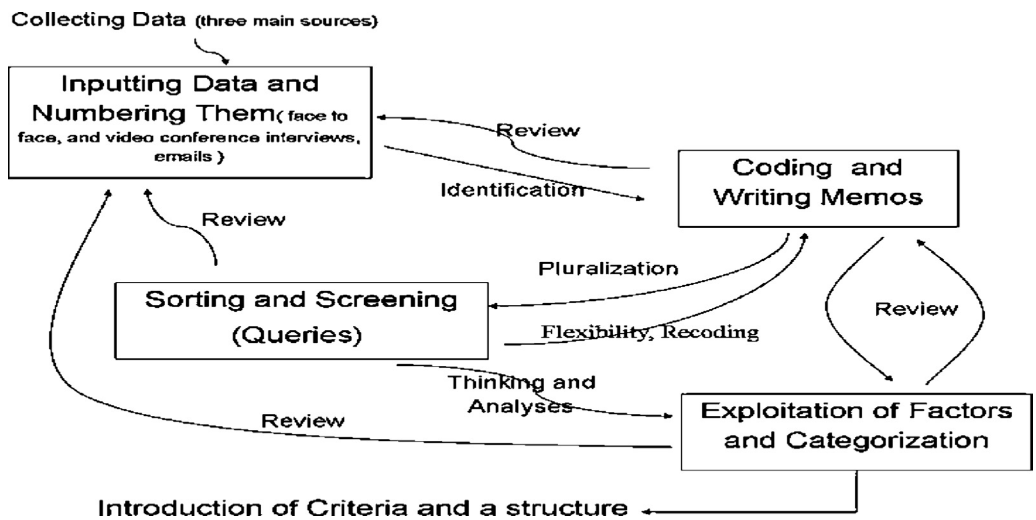


Fig. 8. Framework of data analyzing for the research.

significant. DG is electricity generation in the consumption location or in nearby which can be produced by small-scale power plants, with capacity lower than 25 MW. Therefore, if sustainable power production is available in target location, the operation costs will decline while the benefits of the market development will certainly expand [28]. The other advantage of DG is reduction in competitiveness and therefore risk reduction in result of the market development.

3.2.2. Business and government policies indices

3.2.2.1. Finance index. This index is a financial measurement that indicates the importance of the required investment for each type of RES. The finance required for production of 1 MW/h electricity from different types of energy is illustrated in table below using this index [29]. It seems that this index is very important for the investors and is considered as one of the restrictive factors in their activities in this industry. Renewable energy technologies and related financial investment (project costs) will improve by time [30]. Therefore, renewable energy generation will be generally cheaper in time progress [31]. According to the official reports, the cost of 1 MW/h electricity generation from each type of energy is presented in Table 2, [29].

Technological factors and availability of technology are the noticeable points related with this index [32]. Therefore, regarding the fact that the higher level of technology demands in the further costs, the factor of technology is also measured in this index.

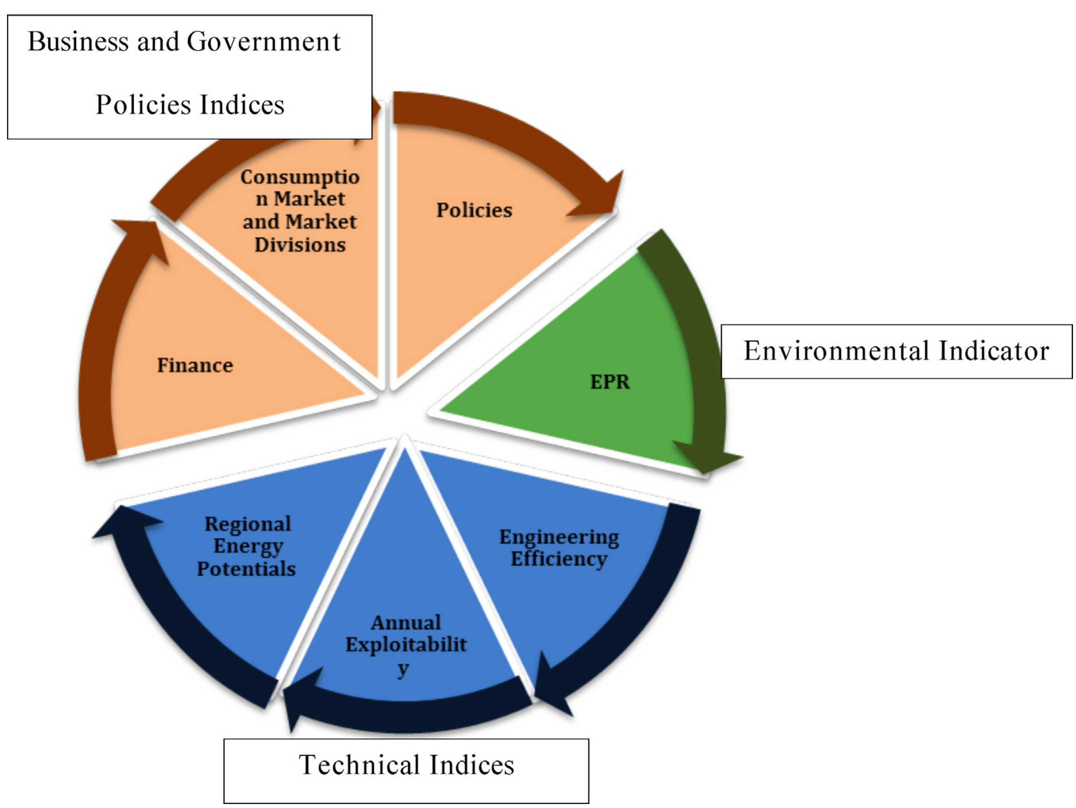


Fig. 9. The identified factors, extracting by analyzing qualitative data from NVIVO9.

Table 2
The expenses of 1 MW/h electricity generation [29].

Energy source	Project cost (€/MWh)
Wind (land)	28–120
Solar	55–260
Biomass	25–75
Hydro	25–90

3.2.2.2. Consumption market and market divisions. The possibility of activity in the different markets using a defined investment has been identified as one of the interests of the investors based on this research. The end user markets are desirable since they provide more advantage compare to the medium markets for the suppliers [33]. In a consumption market, the crucial issue is the advantage–cost of a product or service. Hence, to encourage an end user to purchase a new product, they should be satisfied with the gains compared to the payments [34]. Some reasons, such as the growth in family expenses caused by the real energy prices (Janurary 2011) will promote them to cut the expenditures by using renewable energy. However, the particular interests of some social groups in the utilization of green energy, offers that the customers will also benefit from renewable energy [34]. This factor thus seems to be an important factor for the investors.

3.2.2.3. Conformity with supportive policies of government. This factor is to identify the supportive governmental policies for investment on renewable energy generation, the point that the researchers of this paper found in all of their interviews with responders. On the other hands, the attention level of the government to the renewable energy projects is important in this indicator.

The Iranian governmental policy seems to incentivize the private sector to invest in this area. The researchers in this article have discovered the role of the government, as a policy-maker, as the most important driver to encourage the private sector to enter to this market. Some measures taken into consideration by the Iranian government are as follows:

1. Performing holistic geological and geographical researches about the potential areas of exploitation and then providing an atlas for these locations [35].
2. Eliminating the governmental subsidies for the electricity consumption and energy from fossil fuels in order to offer real prices from the beginning of 2011.
3. Loans and financial incentives for the investment on renewable energy production, provided by the Energy Ministry and the Environment Protection Organization.
4. Guaranteed purchase of electricity harvested form RES by the Energy Ministry from the private sector in long-term contracts, according to the Governmental Financial Regulations Act. 62.
5. Providing the required possibilities of renewable energy business and free energy market in Iran.
6. Permitting the private sector to export their extra sustainable electrical energy to the neighbor countries.
7. Incentives arising from pollution and greenhouse gases control policies [28].
8. Exemption of the rent of lands used by the private sector to build power plants to produce renewable energy [36].
9. Required technological supports and tax waivers for importing the relevant equipment and technology [24].

3.2.3. Environmental indicator

3.2.3.1. EPR. This factor is identified important for investor from customer's demands (market and consumer psychology), sustainability, and possible future rules. According to the reports, the electricity industry produces more than 37% of the world's carbon emissions that is predominant from burning fossil fuels [37].

One of the most reliable indicators according to the international energy agency (IEA) in order to measure the environmental performance of energy generation is energy payback ratio (EPR) [37]. EPR is calculated by the inverse of energy intensity (EI).

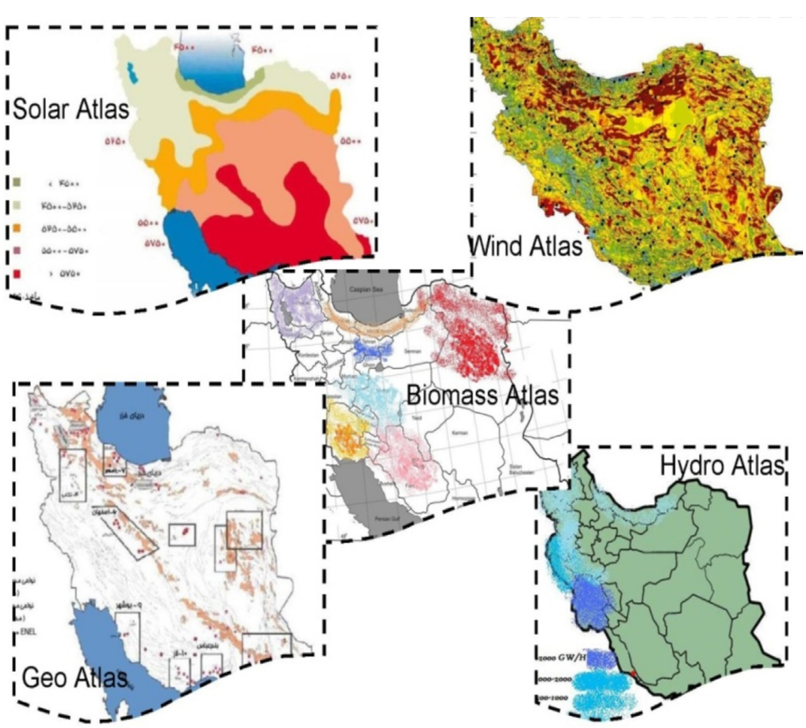


Fig. 10. Potential places for generating electricity from renewable sources in Iran [27].

Table 3
EPR and CO_2 emissions [38].

Energy technologies	Energy payback ratio	Global warming potential (Tons of CO_2/GWh)
Renewable energy technologies		
Hydro power		
With reservoir	48–260	4–18
Run of river	30–267	9–18
Photovoltaic	6–9	44–217
Wind power		
Onshore	34	9.7
Offshore	18	16.5
Biomass		
Direct wood fired	27	400
Integrated biomass gasification combined cycle	15	50
Nonrenewable energy technology [conventional]		
Oil-fired plants	0.7–2.9	937
Coal-fired plants	2.5–5.1	1001–1154
Clean nonrenewable technologies		
Coal gasification combined cycle	3.5–7.0	–
Conventional boiler with carbon capture and geo-sequestration	1.6–3.3	340
Natural gas-fired combined cycle	2.5	440

Table 4
The pairwise comparisons matrix.

	1. Energy efficiency	2. Annual exploitability	3. Regional energy potentials	4. Finance technological	5. Consumption market	6. Policies of government	7. EPR
1. Engineering efficiency							
2. Annual exploitability							
3. Regional energy potentials							
4. Finance technological							
5. Consumption market							
6. Policies of government							
7. EPR							

Table 5
Weight of each criteria (extracting from pairwise comparisons by Expert Choice11).

	Criteria	Weight of criteria
Technical	Engineering efficiency	0.184
	Annual exploitability	0.094
	Regional energy potentials	0.075
Business and policies	Finance	0.109
	Consumption market	0.192
	Government policies	0.213
Environment	EPR	0.133
	Sum	1

The energy intensity is the ratio of the total energy used for construction, operation and decommissioning (E), divided by the electricity output of the plant/device over its lifetime (Et).

$$\mathrm{EI} = \frac{E}{Et}$$

$$Et = \frac{P \times 8760\,h}{y \times L \times T}$$

In which (P) is the power rating, (L) is the load factor (def) and (T) is lifetime. A high EPR indicates good environmental performance while EPR of 1 or less indicates that the system is consuming as much energy as it generates, indicating that it should never be developed. In Table 3, EPR and CO2 emissions of different renewable and non-renewable power plants have been illustrated.

3.3. Ranking of the criteria

In order to rank the identified criteria, second phase, we used Group Pair wise Comparisons as the best and valid method in multi-criteria decision-making, particularly the analytic hierarchy process (AHP) researches. There are feasible advantages in this method. For instance, this method considers people more consistent when they do pair wise comparisons compared to when they just attempt to assign relative weights. Both qualitative and quantitative information can also be compared using informed judgments to derive weights and priorities [39]. As the first step in this method a pair wise comparisons matrix should be built (Table 4). Then, relative importance (or preference) of the each criterion is rated among those that consist of the same parent nodes. Rating is done using the scaled one-pair comparison method from 1 to 9 that is corresponding to the verbal expressions in Fig. 11 [40]. It is noteworthy that in this step, the second questionnaire has been distributed among 38 respondents from the statistical community and 26 responses have been collected Fig. 12.

A square matrix was then formed to compare each two criteria. The matrix consists of the element $aij = 1/aji$ (if item i is 2 times as important as item j, then item j is 1/2 as important as item i). Then, 26 square matrix have been built in which consistency ratio (CR) has been checked. It has been performed to measure the level of consistency of the judgments related to the large samples of purely random judgments. As the result, the judgments are untrustworthy if the CR is greater than 0.1 indicating that they are excessively close to fit in randomness [40]. Therefore, the exercise is invaluable and it must be repeated. Using Expert Choice11 software, inconsistency of the responses has been examined. The results revealed that four of them had the inconsistency rate further than 0.1 that

Intensity of importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Moderate importance	Experience and judgement slightly favour one over another
5	Strong importance	Experience and judgement strongly favour one over another
7	Very strong importance	An activity is strongly favoured and its dominance is demonstrated in practice
9	Absolute importance	The importance of one over another affirmed on the highest possible order
2,4,6,8	Intermediate values	Used to represent compromise between the priorities listed above

Fig. 11. Scaled of pairwise comparisons [40].

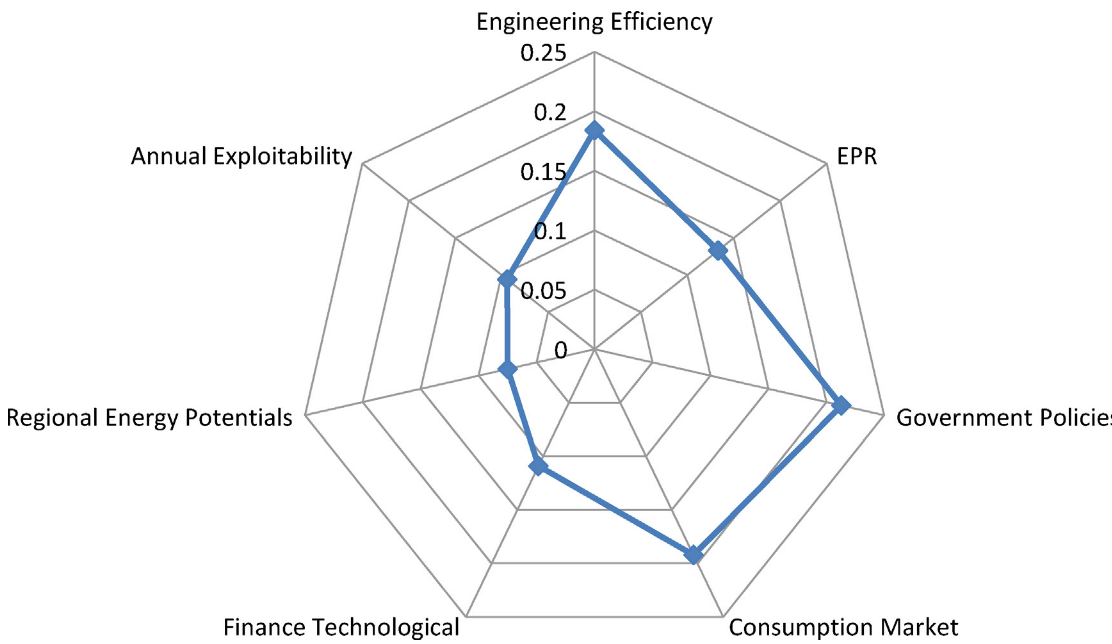


Fig. 12. The radar chart of the weights.

have been eliminated. These measures ensured the reliability of the research. Surveying 22 responses, the geometric average of each element of the matrix has been calculated and a square matrix has been derived at the end. After normalizing the columns, the average of each row has been calculated and based on Expert Choice analysis the final weight of each criterion has been determined and illustrated in Table 5.

Fig. 12 shows the radar chart of the weights to compare the aggregate values of the each criterion. For example, the first factor for the investors is governmental policies. This factor is predictable as an important concern for the investors in the governmental economics, such as Iran. Although the government has attempted to prepare incentives for the private sector to invest in renewable energy, it seems they are insufficient, however. The investors demand an action plans in terms of loans and financial incentives for the investment, in addition to the guaranteed purchase of the electricity generation.

4. Conclusion

Constraints, hazards, and adverse environmental impacts of fossil fuels and nuclear energy are the most significant reasons, in addition to the regional potentials, for scientific attention to the development of sustainable energy. In spite of the abundant competence of alternative resources in the Middle East, development in renewable energy is considered marginal or even stagnant due to the excessive concentration on the fossil resources. Regarding the high economic growth in this region, due to fossil energy exports and the consumption growth inside the region, the future of the energy sector and its incomes will be tackling further challenges. This demands a greater attention to the electricity generation from RES. Making the utilization of RES more economical, it is required to be competitive and subsequently non-governmental. The participation of the private sector as a stimulating engine is therefore economically essential.

Nevertheless, according to the researches, the private sector is permanently cautious to invest on a particularly new industry. In this article, focusing on the private sector investment demands, a group of seven required factors for the diffusion of renewable energy has been recognized. Then, these factors have been classified and ranked in three separated sections including politics and business, engineering, and the environment.

According to Table 4, the factor of politics and business seems to be the salient challenge or even the cause of probable risk of participation in the market, from the investor's viewpoint. Accumulating required data, the researchers discovered that the investors are currently uncertain about the future of this industry and the connected markets, though a specialized supportive organization (SUNA) has been established by the Iranian government. To prepare the scene for participation of the private sector and resolve their uncertainty, they should be informed with accurate, transparent and well-classified data and information, which is examined in this article. For instance, proper understanding and segmentation of the consumption market of renewable energy has been discovered as the second important factor after the governmental policies. This factor contributes in the recognition of the consumption market and true cognition of this market for the investors. In addition, some of the noticeable factors that may be concealed in theoretical researchers are important for the investors, according to this research.

For example, the recognition of regional potentials in renewable energy generation and the relevant exploitation period are two of those criteria that are examined in this research. They can be used for promoting and leading a vast spectrum of future researches. Similarly, the essential study for establishment of a non-governmental industrial union in this area is subject to the further study in the line of this research in the future. It can result in sharing the members' knowledge as well as further study for adopting supportive decisions, market segmentation, the examination of operational obstacles and their relevant risks.

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